Space Weather Technical Forecast

Issued on Friday, 12 November 2021 at 12:17 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: No significant activity.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar Activity was Very Low with background X-ray flux falling below B-class and only a small number of B-class flares observed. There are currently three sunspot regions on the visible disc. AR2893 Hsx/Alpha approaching the northwest limb and AR2894 Hsx/Alpha in the south centre disc are both mature and stable features. AR2895 Bxo/Beta in the north centre disc has been gradually dissipating. No Earth-directed CMEs were observed in available imagery.

Solar Wind / Geomagnetic Activity: The solar wind speed, as measured by DSCOVR was mainly at background, generally below 400 km/s and declining, but with a brief enhancement at 11/2100 UTC to slightly elevated speeds of 450 km/s, before easing again. The density of the wind was above average at first, around 13 ppcc, but declined 11/1600 UTC to be average to below average. The strength of the interplanetary magnetic field (IMF), Bt, was weak, below 7 nT. The north-south component Bz varied between +6 nT and -6 nT, but was mainly positive except for a brief period 11/2330-12/0300 nT when predominately negative (southward) field was observed. The phi angle changed to become negative (towards the Sun) from 11/1430UTC. Resultant geomagnetic activity was Quiet (Kp 0 to 2).

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) as measured by GOES-16, remained at background. The high energy electron flux (greater than 2 MeV) was moderate to background, peaking at 962 pfu at 11/1520 UTC. The 24-hour integrated fluence has remained below the Active threshold (1.0e8 integrated pfu) with 12/0000 UTC observation of 2.89e7 integrated pfu.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to Very Low, with only a slight chance of C-class flares from either of the three active regions currently on the disc.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs. The solar wind speed is expected to mainly be at background, with any enhancements from the arrival of coronal hole fast wind expected to be limited, most likely on day 2 (13th). Geomagnetic activity is expected to be mostly Quiet, with a chance of Unsettled (Kp 0-3), mainly day 2 (13th).

Energetic Particles / Solar Radiation: The high energy (greater than 10 MeV) proton flux is expected to be at or near background levels. The high energy electron flux (greater than 2 MeV) is expected to be mainly at moderate to background levels, perhaps briefly reaching high (1000 pfu) at peak. The corresponding 24-hour electron fluence is expected to remain below the Active level (1e8 integrated pfu).

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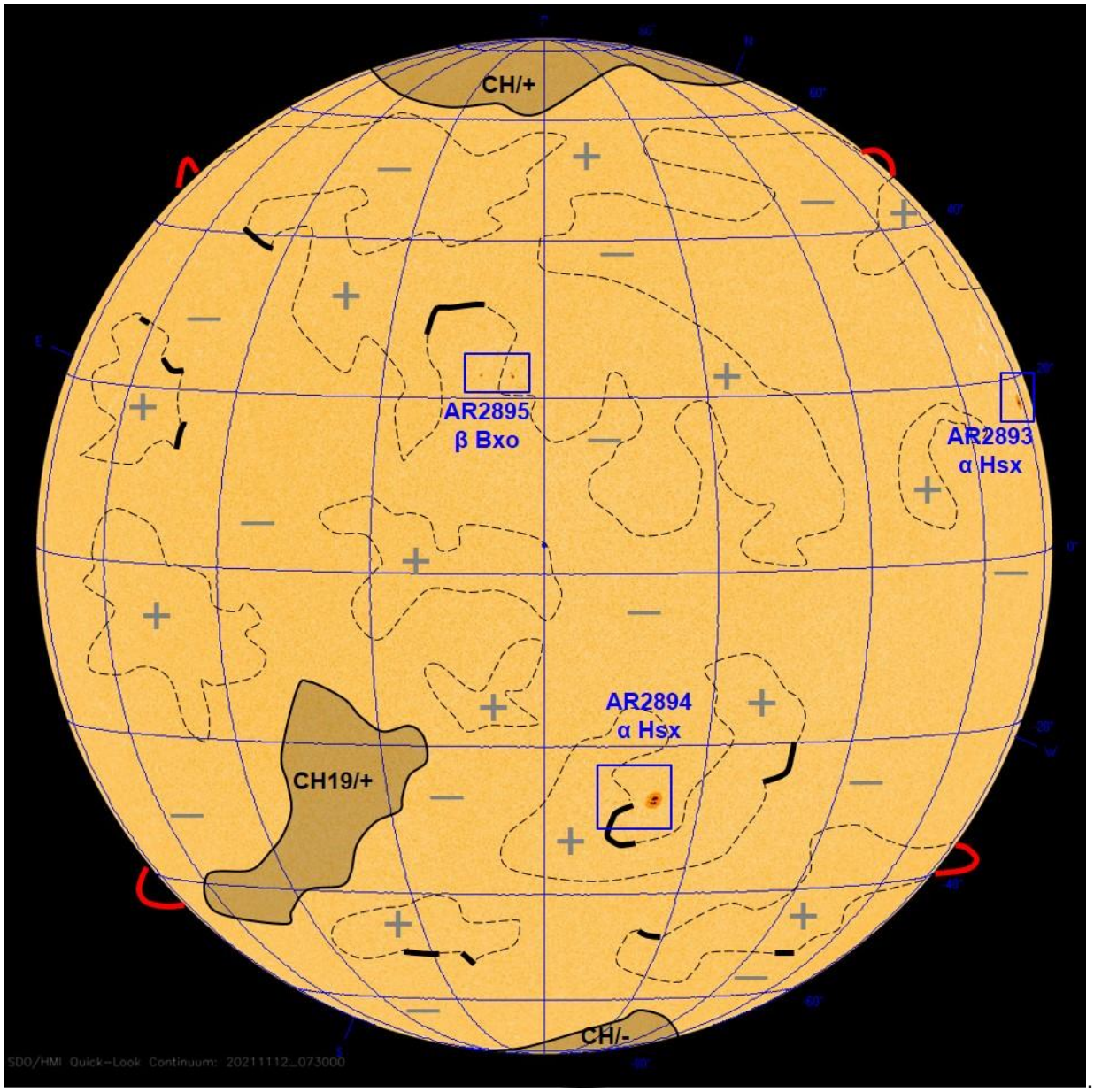
Figure 1. Solar Analysis Valid 12/0800 UTC.



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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Geomagnetic Storms:

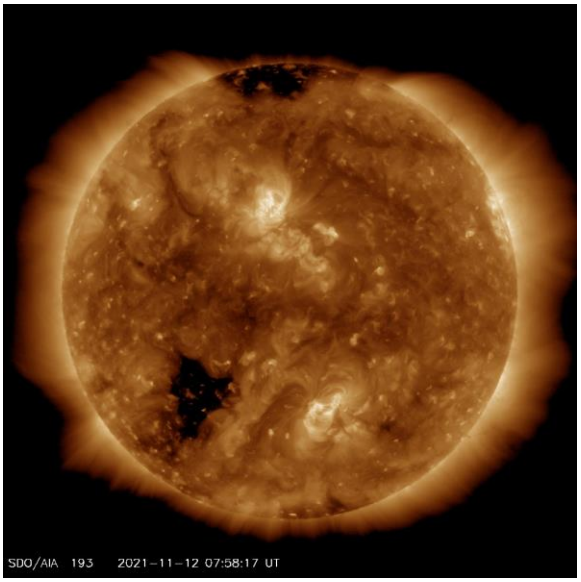
There are no Earth-directed CMEs. Solar winds are currently at background, below 400 km/s, and declining. A small coronal hole in the southwest disc is no longer visible on recent imagery, with any associated fast wind most likely arriving on day 2 (13th) but not expected to bring notable enhancement. The next notable fast winds enhancement is likely to be from coronal hole 19, beyond this forecast period.

Geomagnetic activity is expected to be mostly Quiet, with a chance of Unsettled intervals, most likely on day 2 (13th) due to any slight enhancement from the arrival of weak coronal hole sourced fast wind.

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Geomagnetic Activity - Earthbound Coronal Mass Ejections

Figure 2: SDO AIA-193 with CH in southwest no longer visible



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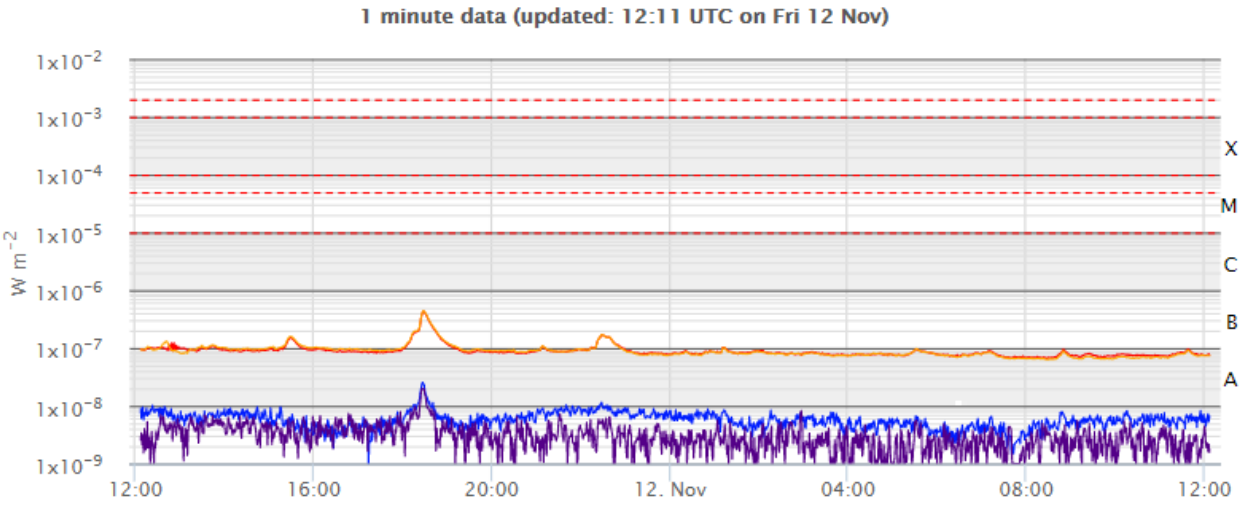
Radio Blackouts - X-Ray Flares:

Solar Activity is currently Very Low and expected to remain at this levels, with only three small and simple sunspot containing active regions. There are two mature Hsx/alpha regions AR2893, near the west limb and soon to rotate off the Earth-facing disc, and AR2894, in the southern centre disc. The third region AR2895 Bxo/Beta in the north centre disc has been gradually dissipating. There is a slight chance of activity increasing to Low (15%) from any C-class flares.

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	2	2	2	2
Very Active	R3 to R5 X Class	No	1	1	1	1

Figure 3: GOES-16/17 X-ray Flux



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Solar Radiation Storms - (High Energy Protons):

The high energy proton flux (greater than 10 MeV) as measured by GOES-16, remained at background during the previous 24 hours, and is currently forecast to remain at this level through the period.

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

High Energy Electrons Event (≥ 2MeV):

The high energy electron flux (greater than 2 MeV) as measured by GOES-16 at GEO is currently Background to Moderate, with peak values gradually declining since the recent enhancements but still with a chance of briefly reaching high (greater than 1000 pfu). No notable sources of further enhancement are anticipated through the period, with a chance of some drop out in values from the arrival of a weak coronal hole sourced fast wind.

The associated 24 hour electron fluence is expected to remain below the Active (1e8 integrated pfu) threshold, with a gradual declining trend. REFM is currently giving good guidance.

GEO Electron Environment Probability (Exceedance)	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ 2 MeV ≥ $1x10^8$	No	1	1	1	1
Very Active	≥ 2 MeV ≥ $1x10^9$	No	1	1	1	1

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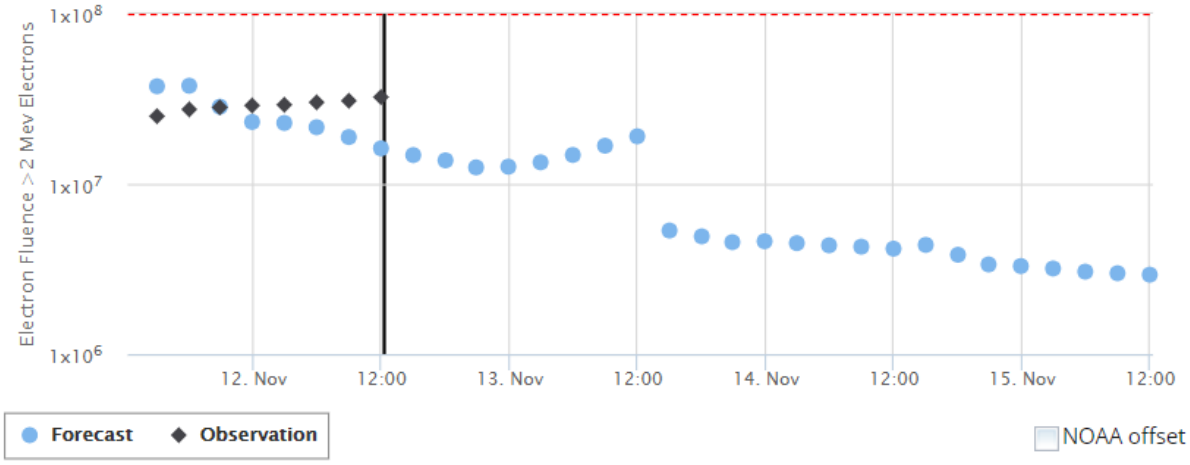
Figure 4: GOES-16 Electron Fluence and REFM



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